CLAIMS

1. A semiconductor manufacturing apparatus comprising:

a plurality of vacuum chambers corresponding to a plurality of processing sections necessary for manufacturing a semiconductor device;

an exhaust device connected to each vacuum chamber;

a plate shaped guide plate arranged at the bottom of each vacuum chamber and having a plurality of gas emission holes; and

a gas supply source for supplying gas to the gas emission holes,

wherein the plurality of vacuum chambers are adjacent to each other by way of a shutter, one of the two adjacent vacuum chambers includes a tray mounted on the guide plate for mounting a substrate to be performed with a predetermined process, a conveying function section having a conveying arm for moving the tray from one vacuum chamber to the other vacuum chamber along the guide plate, and a controlling function section, the controlling function section performing the control so as to open the shutter to communicate the two adjacent vacuum chambers, emit gas from the gas emission holes of the guide plate of the vacuum chambers, and move the tray in one vacuum chamber, which is floated by the emitted gas, from the guide plate of one vacuum chamber to the guide plate of the other vacuum chamber along the guide plate by means of the conveying arm.

2. The manufacturing apparatus according to claim 1, wherein the controlling function section has an operation controlling section for performing operation control of the conveying arm and the shutter, and a

pressure controlling function section for performing pressure control of each vacuum chamber,

the pressure controlling function section includes a configuration of including a pressure adjusting gas supply source for supplying pressure adjusting gas to each vacuum chamber, a pressure detecting part for detecting the pressure in each vacuum chamber, an adjustment valve for adjusting the exhausting amount from each vacuum chamber, and a pressure controlling section for controlling the adjustment valve so as to adjust the pressure of each vacuum chamber when input with a signal from the pressure detecting part.

3. The manufacturing apparatus according to claim 1 or 2, wherein the tray include a locking part for locking the guide plate when being moved by the conveying arm.

4. The manufacturing apparatus according to any one of claims 1 to 3, wherein the conveying function section further includes a drive section for moving the conveying arm, the drive section is configured by a pair of pulleys and a wire winded around the pair of pulleys.

5. The manufacturing apparatus according to claim 4, wherein the drive section include a tensile force adjustment mechanism for maintaining the tensile force of the wire constant.

6. The manufacturing apparatus according to claim 4 or 5, wherein the conveying arm is fastened at one point on the wire, the moving distance of the conveying arm and the moving distance of the one point on the wire are the same when the wire is winded by the pair of pulleys.

7. The manufacturing apparatus according to any one of claims 1 to

6, wherein the tray is grounded to the guide plate and positioned at the relevant position as the emission of gas from the gas emission holes stops.

8. The manufacturing apparatus according to any one of claims 1 to 7, wherein the tray includes a plurality of the engagement parts so as to engage with the conveying arm when the tray is conveyed by the conveying arm,

the plurality of the engagement parts are arranged so as to be lined at a predetermined interval along the moving direction of the tray,

the conveying arm is engaged with the engagement part positioned at the front in the moving direction of the tray thereby moving the tray partway to the target position, and the conveying arm is released the engagement with the engagement part positioned at the front and engage with a different engagement part thereby moving the tray to the target position.

9. The manufacturing apparatus according to claim 8, wherein the emission of gas from the gas emission holes is interrupted from the time the conveying arm releases the engagement with the engagement part positioned at the front until the conveying arm engages a different engagement part, and the tray is grounded to the guide plate and positioned at the relevant position while the emission of the gas is being interrupted.

10. A semiconductor manufacturing method using the semiconductor manufacturing apparatus according to claim 1 comprising the steps of:

mounting the substrate for semiconductor device on the tray of

one of the two adjacent vacuum chambers;

exhausting one of the vacuum chambers with the exhaust device and performing processes necessary for manufacturing the semiconductor device;

communicating the two vacuum chambers by opening the shutter;

floating the tray mounted with the substrate by emitting gas from the gas emission holes of the guide plate of the one or the other vacuum chamber;

moving the tray in the floating state along the guide plate from the guide plate of one vacuum chamber to the guide plate of the other vacuum chamber by means of the conveying arm;

stopping the emission of the gas;

isolating the other vacuum chamber by closing the shutter,

exhausting the other vacuum chamber with the exhaust device; and

performing the processes necessary for manufacturing the semiconductor on the substrate on the tray.

11. The method according to claim 11, wherein the two adjacent vacuum chambers are communicated by opening the shutter, and the pressure of each vacuum chamber is detected and adjusted to a predetermined pressure for reducing the vibration of the tray to be floated, and thereafter, the gas is emitted from the gas emission holes of each guide plate of each vacuum chamber to float the tray on one guide plate, and the floated tray is moved from one vacuum chamber to the other

vacuum chamber by means of the conveying arm while maintaining the pressure of each vacuum chamber at the predetermined pressure.

12. The method according to claim 11, wherein the pressure adjustment gas is introduced into each vacuum chamber, and the pressure of each vacuum chamber is adjusted to 1/800 to 1/5 times of the gas introducing pressure of the gas supply source for supplying the gas to the gas emission holes when adjusting the pressure of each vacuum chamber to the predetermined pressure that reduces the vibration of the tray to be floated.

13. The method according to claim 11 or 12, wherein the step of exhausting each vacuum chamber more than once with the exhaust device is performed before adjusting the pressure of the two adjacent vacuum chambers to the pressure that reduces the vibration of the tray to be floated, or the step of introducing the cleanliness gas into each vacuum chamber is performed between the exhausting steps when performing the exhausting step two or more times.

14. The method according to any one of claims 11 to 13, wherein the exhausting of at least one vacuum chamber out of two vacuum chambers are stopped while adjusting the pressure in the two adjacent vacuum chambers in communication with each other to the pressure that reduces the vibration of the tray to be floated.

15. The method according to any one of claims 12 to 14, wherein the gas of the gas supply source and the pressure adjustment gas are any one of nitrogen gas, argon gas, helium gas, and hydrogen gas, or a mixed gas of two or more of these.